

Expert system

→ It is a computer system that:

- a) emulates human expert.
- b) is able to solve Real-world Problems.
- c) is able to act as a cost-effective Consultant.
- d) Can explain reasoning behind any solutions it finds.
- e) should be able to learn from Experience.
- f) deals with small, well defined domains of expertise.

→ It manipulates Knowledge while Conventional Programs manipulate data.

* Expert systems development (Es lifecycle)

1) Problem definition:

→ explain problem & collect all data about it.

2) System design (Knowledge acquisitions)

3) Formalization (logical design, , tree structures)

4) System Implementation (building a prototype)

5) System Validation (test your program)

* characteristics of an Expert system

- 1) Expertise
- 2) Symbolic reasoning.
- 3) Depth
- 4) self Knowledge.

→ How ^{cl}Conclusions are made?

1) Goal Driven reasoning (backward chaining)

↳ an interface technique which uses (if-then) rules to repeatedly break a goal into smaller subgoals which are easier to prove.

2) Data Driven Reasoning:- (Forward chaining)

↳ an interface technique which uses (if-then) rules to deduce a problem solution from initial data.

Expert system Ability

1] Uncertainty:-

↳ ability of system to reason with rules and data which are not precisely known.

2] EXplanations:-

↳ ability of system to explain the reasoning process that it used to reach a recommendation.

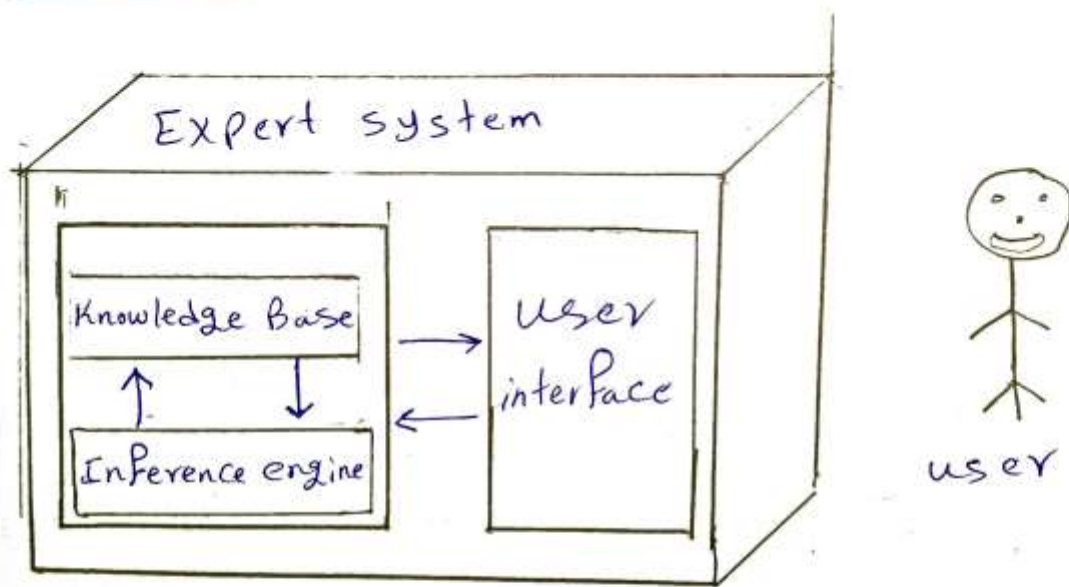
[3] user interface

↳ the portion of the code which creates an easy way to use the system.

[4] Data Representation

↳ The way in which the problem specific data in the system is stored and accessed.

* Expert system components



1) The Knowledge Base

↳ collection of facts and rules which describe all knowledge about problem domain.

(we get it from experts.)

2] Inference engine:

↳ is the part of the system that chooses which facts and rules to apply when trying to solve user's query.

3] user interface:-

↳ the part of the system that ^{takes in the} ~~chooses~~ ^{what} user's query in readable form and passes it to interface engine. it then displays results to user.

* Advantages of Expert system:-

a) EXPerts are not always available but an expert system can be used anywhere, any time.

b) EXPerts may not be good at explaining decisions.

c) Cost effective. d) superior Problem solving.

e) Reliability: Human experts not 100% reliable.

f) work with incomplete information.

g) transfer of Knowledge.

Disadvantages

- a) High development costs.
- b) limited domain
- c) not all problems are suitable.
- d) Can not learn from experience.
- e) Systems are not always up to date, don't learn.
- f) no common sense.
- g) experts needed to setup & maintain system

*Two steps to create expert system

- 1) Knowledge acquisition: extract Knowledge and methods from experts.
- 2) Knowledge representation: Reforming Knowledge & methods into an organised form.

What is Knowledge

Data: Raw facts, figures, measurements.

Information: Refinement and use the data to answer specific questions.

Knowledge: Refined information.

* sources of Knowledge:-

[1] Documented

- ↳ books, Journals, Procedures.
- ↳ Films, data bases.

[2] undocumented:-

- ↳ People's Knowledge and expertise.
- ↳ People's minds, other senses.

* Types of Knowledge:-

- Facts ex: dogs, teeth.
- Relations ex: mother of Emad.
- Rules ex: IF breathing > 20 then Hyperventilating
- Concepts ex: For All $X \ \& \ Y$
- Procedures ex: Do this then that.

⑥